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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/789,112	02/26/2004	Ching-Wei Chang	J-SLA.1477	7586

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EXAMINER	
WASHINGTON, JAMARES	

ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/789,112	CHANG, CHING-WEI	
	Examiner	**Art Unit**	
	JAMARES WASHINGTON	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 06 March 2008.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1,3,4 and 6 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1, 3, 4 and 6 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. In view of the appeal brief filed on March 6, 2008, PROSECUTION IS HEREBY REOPENED. Examiner's new grounds of rejection are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 3, 4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ravishankar Rao et al (US 5943477).

Regarding claim 1, Rao et al discloses a device-specific dot-gain reducing method for multi-level grayscale-image halftoning (Col. 3 lines 8-17; Col. 4 lines 24-28 wherein the method permits computing "printer dependent" calibration) regarding the output of a selected grayscale-imaging multi-level halftone output device (Fig. 3 in which the dot gain reduction method is based on the composite configuration of a plurality of 3 by 3 matrices output by the imaging device) comprising;

based upon observed pixel-infeed (Fig. 3 numeral 31wherein pixels read from the 3 by 3 matrices provided) -to-halftoning-pixel-output operational characteristics of such a device (Fig. 3 numeral 36 wherein statistics are generated for the halftoning pixel output of the composite configuration), creating a pixel-and- color-specific dot-gain reduction curve (Col. 8 lines 31-41 wherein lookup table entries for each pixel of interest specifies the density of ink that the paper will contain. The lookup table is provided to control dot placement and therefore controls dot gain or spread, taking into account neighboring values of the center pixel. The look up table is used synonymously as a "dot reduction curve" as both provide values controlling dot gain. One of ordinary skill in the art could easily "plot" the values stored in the look up table as a reduction curve. Col. 8 lines 46-49 discloses the method can be extended to color printers by using the technique for each color individually. This would provide different gradation levels for each color as opposed to grayscale values.) which relates, as data points for each output color of the

device (Col. 8 lines 46-49), selected corrections in device pixel infeed intensity (Fig. 4 numeral 42 wherein the examining of the neighborhood of the ink density at the center of the matrix reads on device pixel infeed intensity at the center pixel) to different pre-selected, specific, halftone geometric dot patterns of plural pixels including a contained subject pixel which is to be output from the device (Fig. 4 numeral 43 wherein the preselected halftone geometric dot patterns (3 by 3 matrices reads on preselected dot patterns) generated in Fig. 3 are “related to” 3 by 3 neighborhoods (via statistics generated prior) of pixels from the read-in halftone image to provide predicted ink density at the center of the 3 by 3 neighborhood), where those dot patterns include a predetermined geometric pixel arrangement (Fig. 3 wherein the predetermined geometric patterns are 3 by 3 matrices utilizing different dot coverage; "... probabilistic description of the pixel coverage, depending on the surrounding pattern" at column 5 lines 31-32. Depending on the surrounding (geometric) pattern to a central pixel, proper ink coverage for that central pixel is determined) possessing (a) a central pixel (Fig. 2 pixel (i,j), which is the mentioned subject pixel ("For each pixel (i,j), we need to characterize the amount of ink to be printed at that pixel" at column 5 lines 4-5), and (b) the presence or absence of a defined collection and geometric distribution of immediately neighboring pixels (Fig. 1A and 1B), and further where those patterns collectively represent the halftone dot-pattern population characteristics of an expected halftoned color image which is to be output by the device ("The pixel coverage calibration method disclosed allows a simple direct computation of the statistics of the microscopic structure of the image to be printed (one just has to collect what is predicted for each pixel...)" at column 6 lines 1-4 and column 8 lines 46-49)

at a point in the image-processing flow of a stream of color-image pixel data which is upstream from the region where color-image device outputting takes place (Fig. 6 Numeral 74 in which the image is output after . As mentioned above the technique can be applied to color printers by utilizing the method for each color), and downstream from where halftoning of that data occurs (As indicated in Fig. 4 in which the image is halftoned before being read at step 41 to examine 3 by 3 neighborhoods of pixels. Therefore the method of comparing geometric configurations of pixels of the image data to prestored geometric patterns occurs "downstream" or after halftoning the image), and for each pixel in the data which is to be output ultimately to become a color-visible pixel (see above wherein each pixel of the image is indexed as the pixel of interest and the method can be adapted to color output), determining in which pre-selected halftone dot pattern that pixel effectively lies and is associated as the contained subject pixel, and the output color intended for that pixel (Fig. 4 numeral 44 using the lookup table of measured densities which is compiled from 3 by 3 configurations of dots and choosing the 3 by 3 configuration that matches the 3 by 3 neighborhood of the image to determine the ink value at the center of the 3 by 3 neighborhood), and then,

relevant to said determining, and in relation to such a determined halftone dot pattern, appropriately applying to the associated, contained subject pixel the created dot-gain reduction curve (The lookup table of generated values has compensated for dot gain for each center pixel in the 3 by 3 configurations (i.e., applied the dot gain reduction "curve") as previously mentioned, therefore the value chosen, which is selected from the measured densities, for the center dot of the 3 by 3 neighborhood has inherently had the "dot gain reduction" curve applied).

Rao et al fails to expressly disclose the multi-level printing method being that of multi-level color image halftoning method.

However Rao does suggest “anyone versed in the art of digital halftoning should know how to adapt the present invention to color images” at Col. 1 lines 23-24. Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces/market place incentives if the variations are predictable to one of ordinary skill in the art. One of ordinary skill in the art would be inclined to utilize the teachings of Rao et al wherein digital halftoning is performed in a grayscale environment to adapt the method to a color printing system by substituting the grayscale levels for the different gradation levels of each colorant of the printing device.

Regarding claim 3, Rao et al discloses the method of claim 1, wherein each pre-selected halftone dot pattern takes the form of a three-by-three matrix of pixels (Fig. 3 wherein the 3 by 3 configuration is established by using “0” as the random number. These 3 by 3 configurations read on the preselected halftone dot patterns).

Regarding claim 4, Rao discloses the method of claim 1, wherein the selected output device is a printer (column 1 lines 6-7), and said creating is based upon densitometer inspections of such different pre-selected halftone dot patterns which have been printed by the printer as a group of plural, same patterns (column 7 lines 16-26), and wherein further, with respect to each such densitometer-inspected pattern, data points used to create the mentioned curve are determined (column 7 lines 36-42) by comparing (a) densitometer-perceived percentage-of-

coverage readings that are taken of the printed output pattern (column 7 lines 16-20) with (b) the idealized geometrical-percentage-of-coverage of non-white pixels in the pattern ("... statistics for the ink density as a function of the composite configuration are generated..." at column 7 lines 40-41).

Rao does not specifically disclose "next adjacent" patterns.

However, Rao suggests the pluralities of patterns are "next adjacent" patterns by the use of "registration marks" to "align the print and determine the location of the center pixel of each configuration" (at column 7 lines 21-22).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the method of dot gain reduction as disclosed by Rao to use next adjacent patterns (configurations) when measuring the densities of the patch patterns to alleviate the need for multiple test prints.

Claim 6, Rao et al discloses a method for minimizing color-image halftone dot-gain in the output of a multi-level halftone color-imaging output device (see rejection of claim 1) comprising:

characterizing that device's halftone output (Col. 2 lines 29-34 in which a device's halftone output is taken into consideration. Fig. 3 wherein the device generates the composite configurations (halftone output) and the configurations are measured to determine proper ink coverage), on a per-color basis (Col. 8 lines 46-47), regarding geometric pixel-pattern-specific dot gain (Regarding the 3 by 3 configurations wherein, in Fig. 3, the center pixel of the patterns are measured to generate statistics for a true value for the pixel of interest. This means the

patterns generate statistics which correct dot gain of output images by correlating the 3 by 3 configurations to 3 by 3 neighborhoods of pixels in the image and assigning a value to a pixel of interest from the correlation thus characterizing the device's halftone output) of which can be related to device pixel-infeed intensity levels (Intensity levels of pixels (i.e., gradation values) in an image directly effect the amount of ink coverage (i.e., density) at a given location in the image. Therefore, geometric pixel-pattern-specific dot gain is related to the intensity levels or gradation values input into the device), and from that characterizing (i.e., from providing the look up table values from Fig. 3), creating and then applying to throughput color-image files, on a pixel-by-pixel basis, a pixel-to-device infeed intensity correction value based upon geometric pixel pattern considerations (see rejection of claim 1 wherein the 3 by 3 neighborhood of pixels are compared to the 3 by 3 configuration statistic information to determine the ink density at the center of the neighborhood of pixels thus providing the infeed intensity correction based upon the configuration statistics previously stored), thus to minimize device-output dot gain (Fig. 4 numeral 42-44 wherein the predicted ink density is provided for the center pixel of the 3 by 3 neighborhood thereby minimizing dot gain).

Response to Arguments

4. Applicant's arguments with respect to claim 1 that " '477 does not generate a calibration curve; instead relies on look up tables", the method of the invention illustrates a method for use with monochrome printers, and that claim 1 requires:

"…at a point in the image-processing flow of a stream of color-image pixel data which is upstream from the region where color-image device outputting takes place, and downstream from where halftoning of that data occurs…"

have been considered but are moot in view of the new ground(s) of rejection.

Note that every methodical limitation is believed to be taught by at least the passages of Rao et al cited above. Structural elements are not claimed within the present application. While the functional limitation of the generated "reduction curve" has been fully considered, it is not patentable over Rao et al's "look up tables", as this functional limitation claimed is equivalent with respect to intended use of the look up tables.

Furthermore, the method as disclosed by Rao et al is fully capable of performing each and every one of the functional limitations recited in claim 1 as indicated above. The basis for examiner's rationale and conclusion may be found in MPEP 2111.04 which states "[c]laim scope is not limited by claim language that suggests or makes optional but does not require steps to be performed or by <u>claim language that does not limit a claim to a particular structure</u>. " (emphasis added). See also In re Schreiber, 44 USPQ2d 1429 (Fed. Cir. 1997).

5. Applicant's arguments filed March 6, 2008 have been fully considered but they are not persuasive.

Remark: Regarding the argument that Rao's method of calibration does not depend upon geometric considerations, in no way deals with any preselected group of geometric patterns of pixels, and features instead, as its expressly stated central contribution to the art, the practice of examining printed calibration material by looking specifically to determine the amount of ink that is deposited at a particular central location in a grouping of pixels. Nothing specifically proposed by the reference has anything to do consciously with addressing optical dot gain.

Response: Rao, as shown in the rejection of claim 1, discloses the calibration method being dependent on "geometric considerations" as the 3 by 3 configurations used to determine the statistics generated for the look up tables reads on geometric considerations. These considerations take the surrounding neighborhood of a pixel of interest into consideration when determining the proper amount of ink to place at a location. As described in column 8 lines 31-41 where the "neighborhoods" are mapped into an index and the lookup table entry at this index (or pattern of geometric dots) specifies the density of ink that the paper will contain at that central pixel. Shown also in Fig. 3, the statistics generated for the density of the central pixel according to the 3 by 3 matrix (or "as a function of the composite configuration") is stored in the form of a lookup table. This means the ink density of a central dot is stored according to the pattern of dots surrounding the central dot, which suggests groups of preselected "geometric patterns" are used to establish the index into the look up tables to compare against the inputted pixel patterns shown in Fig. 4 numeral 42.

As for the argument that "nothing specifically proposed by the reference has anything to do consciously with addressing optical dot gain", the mere fact that this is simply stated in the

specification but not claimed in technical form renders this argument moot. Rao discloses that optical dot gain is compensated for by "measuring" for this type of dot gain and not simply inherent to a method of calibration with reference to Henry Kang "Color Technology for Electronic Imaging Devices" SPIE Optical Engineering Press 1997 (at column 1 lines 57-67 and column 2 lines 1-5). As stated ("If the measurement tools which are used to implement the present invention measure the coverage of the ink on paper, these previous theories can be used to obtain the corresponding human visual response" at column 1 line 67 through column 2 lines 1-3), it would be well known in the art to measure and thus calibrate the printer for optical dot gain by employing these well known techniques mentioned although optical dot gain is not addressed in the claim.

Remark: Geometric pattern thinking is not only foreign to the practice described by the cited and applied prior art reference; it is studiously avoided and ignored:

"The present invention generally relates to the calibration of digital printers, such as laser and ink jet printers, and, more particularly, to a method and apparatus for calibrating a printer, which method and apparatus do not depend on geometric assumptions on the printed dots. '477, Col. 1, lines 5-10."

Response: Applicant continues to cite portions of the cited prior art of which are taken out of context. Careful reading of the cited portion of the prior art when taken in context clearly shows the geometric assumptions referenced by applicant pertain to the actual printed central dot <u>shape</u> (e.g., round or square) and not the "pattern of geometric dots surrounding the central dot" which

makes up the 3 by 3 configurations. Geometric patterns of dots or "3 by 3 configurations" are clearly used in determining the appropriate ink coverage at a pixel of interest as rejected above.

Remarks: Regarding claim 6, the rejection should be overturned because the Examiner has applied '477's technique of geometric look up tables to Applicant's provision of geometric pixel-pattern-specific dot patterns, which is not instructive as to Applicant's method of the invention.

Response: Applicant's method of invention as claimed in claim 6 calls for the device's halftone output to be characterized on a per-color basis regarding geometric pixel-pattern-specific dot gain. Examiner's rejection clearly shows the halftone output image as delivered by the printer of Fig. 6 numeral 74, on a per-color basis (Col. 8 lines 46-47), is determined from the geometric pixel patterns (3 by 3 configurations of Fig. 3) generating statistics for the density of the central pixel. Therefore the pixels of the image to be printed (as shown in Fig. 4) is corrected by choosing the appropriate ink density (reducing dot spread/gain) at the appropriate location.

Remarks: The Examiner then applies '477 lookup table to Applicant's intensity correction value, which is clearly stated as deriving from the correction curve, which correction curve, and hence, which intensity correction value, is nowhere taught nor suggested by '477.

Response: The intensity correction value, as understood by examiner, is simply the value chosen for the ink density of the pixel of interest given a 3 by 3 neighborhood of pixels. Therefore Examiner applies the look up tables in that the look up tables provide the correct value

for the ink density at the pixel of interest (Fig. 4 numeral 44), which has the same functionality of the intensity correction value, which is a value chosen for the ink density at the given location.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAMARES WASHINGTON whose telephone number is (571)270-1585. The examiner can normally be reached on Monday thru Friday: 7:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, King Poon can be reached on (571) 272-7440. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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